

#### (D) REMARKS

The amendment to the specification is for the purpose of adding clarity to the description. Paragraph [0035] is amended to differentiate the two types of Fourier transforms referred to. These two types of Fourier transforms are the temporal Fourier transform from the time-space domain  $(x_1, x_3, t)$  into the spatial frequency domain  $(x_1, x_3, s)$  and the spatial Fourier transform from the spatial frequency domain  $(x_1, x_3, s)$  into the spatial Fourier domain  $(js\alpha_1, x_3, s)$ . The temporal Fourier transform is well known in the art and thus is not defined. The spatial frequency domain is the same as the “frequency domain  $(x, s)$ ” referred to in the first sentence of paragraph [0032], since  $x = (x_1, x_3)$ . All the equations in the specification are written with the data already transformed into the spatial frequency domain, for simplicity of illustration. The spatial Fourier transform is defined in equations (1) and (2) and is referred to throughout the remainder of the specification, as originally filed. Thus, no new matter is added by this amendment. An Affidavit or Declaration is included with this response stating that the amendatory material does not add new matter since it consists of the same material already present in the application as originally filed.

Claims 1-40 are pending in the present patent application and all claims are rejected in this Office Action. The Examiner rejects claims 1-40 under 35 U.S.C. §103(a), as being unpatentable over Robertson *et al.*, U.S. Patent No. US-6,775,618 B1, in view of Harris *et al.*, U.S. Patent No. US-5,150,331 A.

Claims 1, 16, 26, 33, and 40 are amended to clarify the method of the invention. The phrase “independently of knowledge of a source wavelet” is added. This feature, independence of knowledge of the source wavelet, is discussed in the specification in the last sentence of paragraph [00650], the first sentence of paragraph [0066], the third sentence of paragraph [0072], and the second and third sentences of paragraph [0081].

Claims 10, 22, and 39 are amended to correct a typographical error. The term “spatial frequency domain” is changed to the term “spatial Fourier domain”. The separation of the upgoing component of the data transformed into the spatial Fourier domain, as in claims 10, 22 and 39, is discussed in paragraphs [0037] through [0047] of the specification. The separation of the downgoing component of the data transformed into the spatial Fourier domain, as in claim 39, is discussed in paragraphs [0048] through [0054] of the specification.

Claims 1 and 26 are further amended to remove the phrase “the decomposing comprising transforming the data into the spatial frequency domain and separating the upgoing and downgoing wavefield components in the transformed data” and move the phrase into new dependent claims 41 and 42, respectively, with “spatial frequency domain” changed to “spatial Fourier domain”, as discussed in the previous paragraph.

The remaining claims are retained as originally filed. A complete listing of the amended claims is provided on separate sheets in section (C) Amendments to the Claims, in compliance with 37 CFR 1.121.

Per independent claims 1, 10, 16, and 26, the Examiner states that Robertson *et al.* (‘618) discloses a system, method, and computer program for deghosting and water surface multiple reflection attenuation using pressure and vertical particle motion data. The Examiner states that Robertson *et al.* (‘618) discloses a spatial filter designed to effectively separate the up-going and down-going wavefield components of the seismic data. The examiner states that the difference between claims 1, 10, 16, and 26 and Robertson *et al.* (‘618) is that the decomposition step specified in the claims takes place in the frequency domain and the up-going component is then inverse transformed into the time domain.

The Examiner states that Harris *et al.* (‘331) discloses a method for enhancing seismic data by attenuating noise with a filter. The Examiner states that Harris *et al.* (‘331) discloses that typically seismic data is first transformed from the time domain to the frequency domain, filtered (attenuated) in the frequency domain, and then transformed back to the time domain. The Examiner states that it would have been obvious to modify Robertson *et al.* (‘618) by combining with Harris *et al.* (‘331).

However, neither Robertson *et al.* (‘618) nor Harris *et al.* (‘331) teaches or suggests a method for deghosting and water surface multiple reflection attenuation in dual sensor marine seismic data “independently of knowledge of a source wavelet”, as in the present invention, as embodied in independent claims 1, 16, and 26. Further, neither Robertson *et al.* (‘618) nor Harris *et al.* (‘331) teach or suggest a method for deghosting marine seismic data that includes “transforming the data into the spatial Fourier domain” and “separating an upgoing wavefield component of the transformed data in the spatial Fourier domain”, as in the present invention, as embodied in independent claim 10. Thus, the subject matter of independent claims 1, 10, 16, and 26 (and their dependent claims 2-9, 11-15, 17-25, 27-32, respectively), as amended, of the

present application cannot be derived from either Robertson *et al.* ('618) and Harris *et al.* ('331), alone or in combination, in an obvious way.

Per independent claim 33, the Examiner states that Robertson *et al.* ('618), at col. 2, lines 48+, discloses the insensitivity of its method to streamer depth, thus allowing the streamer to be towed.

However, neither Robertson *et al.* ('618) nor Harris *et al.* ('331) teaches or suggests a method for deghosting and water surface multiple reflection attenuation in dual sensor marine seismic data "independently of knowledge of a source wavelet", as in the present invention, as embodied in independent claim 33. Thus, the subject matter of independent claim 33 (and its dependent claims 34-40), as amended, of the present application cannot be derived from either Robertson *et al.* ('618) and Harris *et al.* ('331), alone or in combination, in an obvious way.

The Examiner states that dependent claims 2-9, 11-15, 17-25, 27-32, and 34-40 are further provided for by the above combination of Robertson *et al.* ('618) and Harris *et al.* ('331). However, since independent claims 1, 10, 16, 26, and 33 are allowable, their dependent claims 2-9, 11-15, 17-25, 27-32, and 34-40, respectively, are also allowable. Therefore, applicant believes that all claims, 1-42, as amended, are ready for acceptance.

Thus, Applicant believes that the preceding amendments to the specification and claims place this application in condition for allowance. Applicant respectfully requests the favorable consideration and allowance of this application.

Respectfully submitted,

Date: 09/21/2005

Charles R. Schweppe  
Charles R. Schweppe, Reg. No. 38,612  
8114 Landau Park Lane  
Spring, TX 77379-7169

Counsel of Record  
E. Eugene Thigpen, Reg. No. 27,400  
Petroleum Geo-Services, Inc.  
15150 Memorial Drive  
Houston, TX 77079  
Telephone: 281-509-8368